

REMARKS

In the Office Action of May 17, 2004, claims 14-19 were rejected under 35 U.S.C. § 101 as claiming the same invention as claims 15-20 of prior U.S. Patent No. 6,601,380. Pursuant to the above amendments, method claims 14-19 have been cancelled. The new claims include method claims 33-39 which are sufficiently different from the '380 patent claims 15-20 to overcome the same invention double patenting rejection. Reconsideration is respectfully requested.

Claims 1-13 were rejected under the judicially created doctrine of obviousness-type double patenting in view of claims 1-13 of U.S. Patent No. 6,601,380. This double patenting rejection has been overcome by the filing of a Terminal Disclaimer. Entry of such Terminal Disclaimer is respectfully requested.

The specification objections to dependent claims 6, 7 and 11 have been overcome by the cancellation of such claims. The newly added claims are in proper dependent form and thus overcome this rejection.

Claims 4-7 and 9-13 were rejected under 35 U.S.C. § 112 as being indefinite. This rejection is not fully understood. The Examiner states that according to claims 1, 3 and 9, the claimed invention may have only one fluid inlet opening. This is not true. Claim 1 clearly recites "one or more" fluid inlet openings in the wall portion, while claims 3 and 9 recite "at least one of said one or more" fluid inlet openings to be positioned adjacent to said outlet end wall portion. In any event, the rejected claims, have been cancelled and replaced with new claims which are believed to overcome the § 112 rejection.

In the Office Action of May 17, 2004, claims 1, 2 and 8-13 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Blackman Patent No. 3,158,997 and claims 3-7 were rejected under 35 U.S.C. § 103(a) as being obvious over *Blackman*. Pursuant to the above amendments, original claims 1-19 have been cancelled and new claims 20-39 have been added which more clearly define the present invention and which are clearly patentable over *Blackman*. The new claims include independent claim 20 and dependent claims 21-32 directed to a rocket engine and independent claim 33 and dependent claims 34-39 directed to a method of propelling a rocket. Both the rocket engine claims as well as the method claims now require first and second combustion component fluids, with the second combustion component being introduced through openings located in the side wall portion or the end wall portion and at a point

downstream from introduction of the first combustion component fluid and at a point prior to the inner spiral flow.

The Blackman patent is directed to a tribrid rocket combustion chamber. The combustion chamber of *Blackman* includes two chambers or chamber portions: the chamber 22 and the hydrogen mixing chamber 50. The chamber 22 includes an outlet end defined by the inner vortex 46 which flows into the hydrogen mixing chamber 50. In the combustion chamber of *Blackman*, oxidizer is introduced through the openings 34 in the nozzle end wall to create the vortex flow along the wall 24 and hydrogen is introduced through the openings 54 into the inner vortex 46 within the hydrogen mixing chamber 50. *Blackman* also discloses in column 2, lines 52-54, that a small amount of hydrogen may also be provided adjacent the oxygen passage 34. The side wall of *Blackman* is provided with a solid propellant grain 24.

Independent claim 20 requires at least one first fluid inlet opening for a first combustion component fluid and at least one second fluid inlet opening for a second combustion component fluid. The first fluid inlet opening is required to be in the wall portion for creating an outer spiral flow of fluid along the side wall toward the closed end, then inwardly toward the chamber axis and then an inner spiral flow along the chamber axis toward the nozzle end. The second fluid inlet openings are required to be either in the side wall or the closed end wall and downstream of the first fluid openings so that the second combustion fluid is introduced into the chamber at a point downstream from the first fluid opening and at a point prior to said inner spiral flow. This is clearly distinguishable from *Blackman*. In *Blackman*, the hydrogen component (the second component) is not positioned either in the side wall or the closed end wall as required by claim 20. The hydrogen component is also introduced at a point within the inner vortex (the inner spiral flow) in direct contradiction to the requirement of claim 20. In fact, the claims of *Blackman* specifically require two chambers with the second chamber (the hydrogen mixing chamber 50) receiving fluid from the main chamber and the second reaction fluid being introduced into this second chamber within the inner vortex. Thus, independent claim 20 clearly distinguishes from *Blackman*.

Even if *Blackman* is assumed to include introducing a small amount of hydrogen adjacent the oxygen passage 34 as suggested in column 2, lines 52-54, this introduction of hydrogen is not through a side wall or a closed end wall as now required by independent claim 20, nor is it downstream from the introduction of oxygen as now required by claim 20.

In the § 103(a) rejection, the Examiner has taken the position that placing the injection inlet in the side wall would have been obvious in view of the Blackman disclosure. Applicant does not agree. In *Blackman*, the side wall is formed of, or provided with, a solid propellant grain 24. Thus, if the injection inlet was in the side wall, it would be blocked by the propellant grain 24 or would have to pass through it. There is absolutely no teaching or suggestion in *Blackman* that such a structure would be possible. In fact, the conclusion which one must draw from the teachings of *Blackman* is that the injection inlet 34 must, as a matter of necessity, be in the nozzle end wall and at a point radially inwardly of the solid propellant grain 24. Otherwise, the injection inlet 34 would be in the solid fuel grain 24.

Accordingly, independent claim 20 and its respective dependent claims 21-32 are in condition for allowance.

Independent method claim includes limitations similar to those of claim 20. Specifically, claim 33 requires introducing a first component fluid through one or more first fluid inlet openings to create an outer spiral flow and an inner spiral flow and then introducing a second combustion component fluid through one or more second fluid inlet openings in said side wall portion or said end wall portion at a point downstream from the first fluid inlet openings and prior to said inner spiral flow. For the same reasons as discussed above with respect to claim 20, these limitations clearly distinguish from *Blackman*.

Accordingly, it is submitted that claim 33 and its respective dependent claims 34-39 are in condition for allowance.

Conclusion

For all of the above reasons, and particularly in view of the newly added claims, the discussion of the Blackman patent and the differences between the claims and such patent, it is submitted that all of the claims are now in condition for allowance and such action is respectfully requested.

Enclosed is a check in the amount of \$55.0 for the filing fee of the Terminal Disclaimer. Also enclosed is a check in the amount of \$215.00 for the filing of the Extension period of two-months making this a timely filed response. The Commissioner is hereby authorized to charge any deficiencies or credit any overpayments to Deposit Account No. 04-1420 , and notify us of the same.

Respectfully submitted,

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